

# PROJECT

Our project provides a new idea for hydrogen energy construction and gives a new solution for the algae pollution by using green algae—*Chlamydomonas reinhardtii* to produce hydrogen.

## Proof of concept

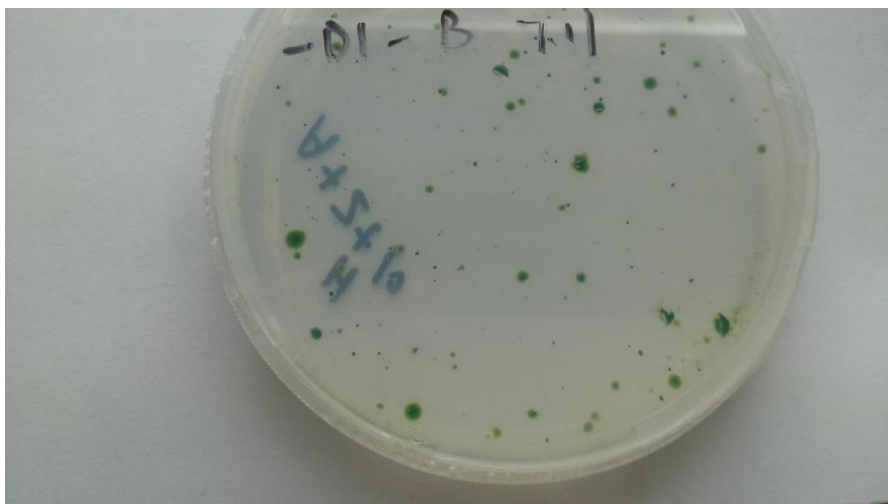
SZU-China is great at making things work! Not only is our team doing an incredible job with theoretical models and experiments, but also in taking the first steps to make our project real.

### Proof our device work

#### BBa\_K1884011: RBCS2 Promoter+Paromomycin+RBCS2 Terminator

We provided Paromomycin resistance under the RBCS2 promoter (BBa\_K1884010)

For testing the efficiency of BBa\_K1884011, we transform this device into *Chlamydomonas reinhardtii* and grow them on TAP plate with Paromomycin. There is a photograph to show several monoclonal colonies growing on the TAP plate which proves that this device works.

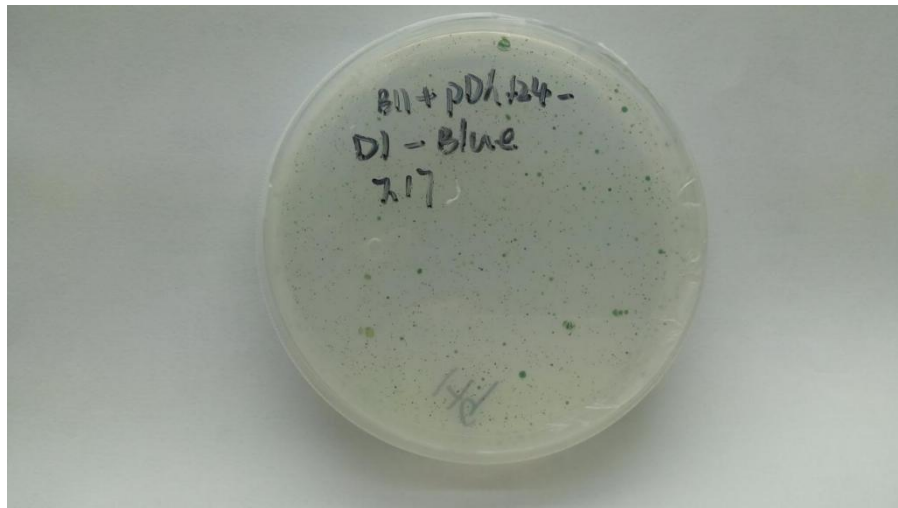


#### BBa\_K1884012: RBCS2 Promoter+Hygromycin B+RBCS2 Terminator

We provided Hygromycin B resistance under the RBCS2 promoter (BBa\_K1884010)

For testing the efficiency of BBa\_K1884012, we transform this device into

*Chlamydomonas reinhardtii* and grow them on TAP plate with Hygromycin B. there is a photograph to show several monoclonal colony growing on the TAP plate which proof that this device works.

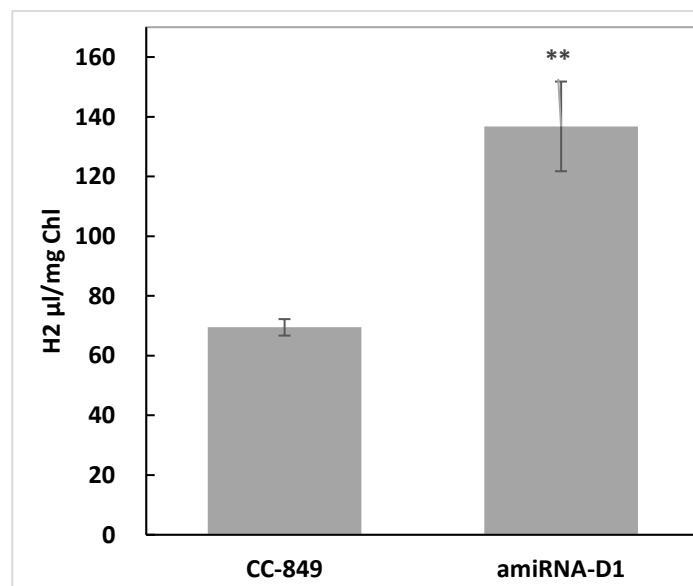


### Proof our system work

We had tested the work of microRNA and light-mediated system by detecting the hydrogen yield of wild strain CC-849 and transformants.

#### microRNA

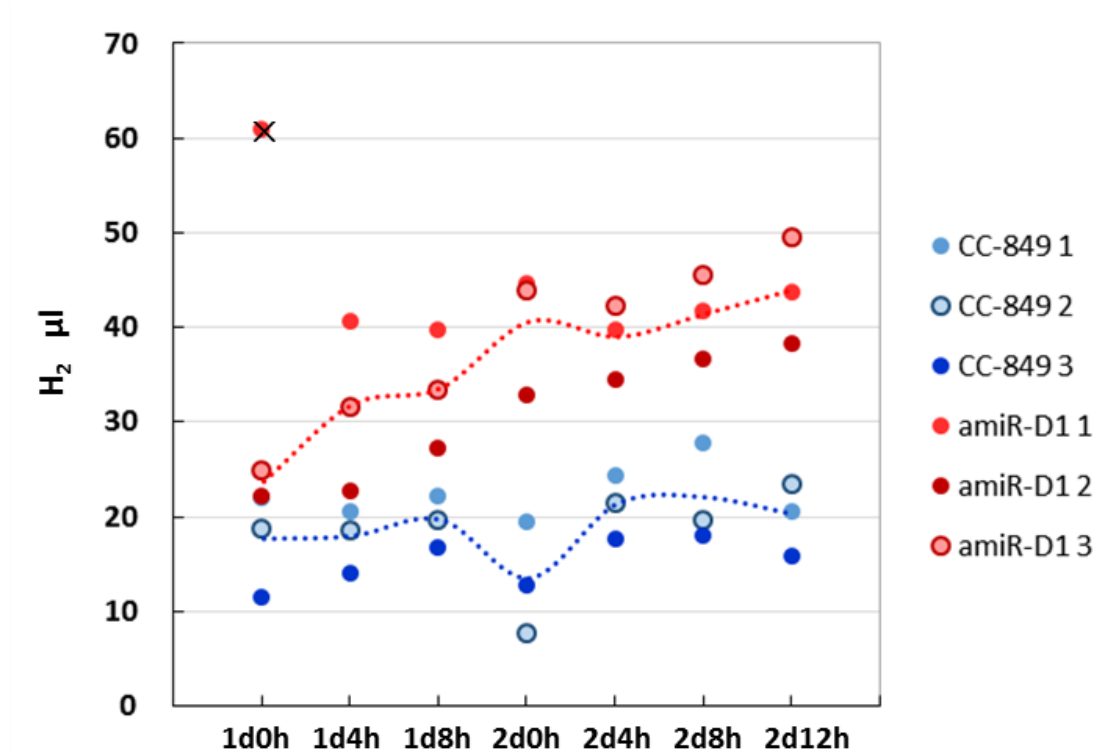
We cultivated the gene-modified green algae in blue light ( The wave length is about 450 nm) and induced the expression of relevant miRNA. When they reached logarithm stage, we measured hydrogen production. The experiment results indicated that the hydrogen production of the transformants increased after induced with blue light. The result proofed that our designed microRNA did have effect on inhabiting the photosynthesis of green algae reaction system.



#### Light-mediated expression system

We also cultivated the gene-modified green algae in the condition lacking in blue light. ( Red light LED plant growth lamp, peak wave length: 660nm, half width: 17.9nm, dominant wave length: 642.4 nm, purity: 0.989).

When the green algae reached logarithm stage, we used blue light, whose wave length is about 450 nm, to induce the expression of the relevant miRNA and increase hydrogen production. First we used blue light to induce the expression of miRNA and measured hydrogen production every 4 hours. After 8 hours, we re-cultivated the green algae in red light. After 16 hours, again we used blue light to induce the expression of miRNA and measured hydrogen production every 4 hours for 12 hours. The results indicates that the hydrogen production of will increase when induced with blue light. After re-cultivated with red light and repeating induced with blue light, the hydrogen production



will increase again. This result proofs that it's effective for the light-mediated expression system . If repeating to induce the green algae with blue light, we can ultimately make this system produce hydrogen continuously.

## Proof the feasibility of our application model



We wish our project can actually be helping people and especially the ones who have desperate need for better energy. In china, the life and education are totally different between cities and countrysides. We live in the city and we have all kinds of energies we need. We have endless electricity. Too much that sometimes we even don't realize that we are wasting it. But the countryside is totally different.They have limited electricity only applied for a period of time in a day. And we really want to help them with our project. So we decided to design a application model for people from countryside.This model shows how we can use our project to produce hydrogen and be used in the house as electricity. It is totally suitable for the villagers to use because they have the field.

Also,we paid a visit to a village in Hunan province for field trip.We found a family, they have a pond beside their house.We made some measurement on the pond and had a deep discussion with the family members.In this way we take the first step in bringing the application model to the real.